WHAT IS CLAIMED IS:

1. A process for manufacturing a water-vapor-permeable, watertight, heat reflecting flat composite comprising a metal layer and a nonporous, water-vapor-permeable, watertight, hydrophilic flat substrate, wherein the metal layer has a surface facing the substrate and a surface facing away from the substrate, and wherein the substrate has a surface facing the metal layer and a surface facing away from the metal layer, comprising at least the following steps:

a) selecting the substrate,

b) pre-cleaning at least one surface of the substrate, and

c) applying the metal layer to the surface of the substrate facing the metal layer.

2. The process according to claim 1, wherein the substrate comprises a polyether ester, polyether amide, or polyether urethane film.

3. The process according to claim 1, wherein the substrate is joined to a textile fabric on the surface facing away from the metal layer to be applied in step c).

4. The process according to claim 1, wherein the substrate selected in step a) is joined to a textile fabric on the surface facing the metal layer to be applied in step c), wherein filaments of the textile fabric are spaced apart.

5. The process according to claim 1, wherein the pre-cleaning in step b) is conducted on the surface of the substrate facing the metal layer to be applied in step c).

6. The process according to claim 1, wherein the pre-cleaning in step b) comprises a plasma treatment in oxygen.

7. The process according to claim 1, wherein the pre-cleaning in step b) comprises a plasma treatment in a gas containing oxygen.

8. The process according to claim 7, wherein the gas containing oxygen comprises a mixture of about 10% to about 50% oxygen by volume and about 90% to about 10% nitrogen by volume.

9. The process according to claim 7, wherein the gas containing oxygen is air.

10. The process according to claim 9, wherein the plasma treatment is conducted at atmospheric pressure.

11. The process according to claim 9, wherein the plasma treatment is conducted in a vacuum.

12. The process according to claim 11, wherein the vacuum has a pressure of about 1 mbar to about 0.001 mbar.

13. The process according to claim 12, the vacuum has a pressure of about 0.01 mbar to about 0.03 mbar.

14. The process according to claim 1, wherein the applying of the metal layer in step c) to the surface of the substrate facing the metal layer is performed by physical vapor deposition.

15. The process according to claim 1, wherein the metal layer has a thickness of about 10 nm to about 200 nm.

16. The process according to claim 1, wherein the metal layer has a thickness of about 30 nm to about 180 nm.

17. The process according to claim 1, wherein the metal layer is comprised of Al, Cu, Au, or Ag or an alloy of AgGe, CuZn, CuSn, CuAg, or CuAgSn.

18. The process according to claim 1, wherein the process further comprises applying a protective layer to the metal layer following step c).

19. The process according to claim 18, wherein the protective layer is a cross-linked polyurethane.

20. A water-vapor-permeable, watertight, heat-reflecting flat composite comprising a metal layer and a nonporous, water-vapor-permeable, watertight, hydrophilic flat substrate, made by the process according to claim 1.

21. A water-vapor-permeable, watertight, heat-reflecting flat composite comprising a metal layer and a nonporous, water-vapor-permeable, watertight, hydrophilic flat substrate, wherein the metal layer has a surface facing the substrate and a surface facing away from the substrate, the substrate has a surface facing the metal layer and a surface facing away from the metal layer, and the metal layer adheres at least predominantly to the substrate surface such that it passes a Tesa tape test.

22. The composite according to claim 21, wherein the adhesion of the metal layer passes the Tesa tape test over the entire surface of the substrate.

23. The composite according to claim 21, wherein the substrate is joined to a textile fabric on the surface facing away from the metal layer.

24. A water-vapor-permeable, watertight, heat-reflecting flat composite comprising a metal layer and a nonporous, water-vapor-permeable, watertight, hydrophilic flat substrate, wherein the metal layer has a surface facing the substrate

and a surface facing away from the substrate, the substrate has a surface facing the metal layer and a surface facing away from the metal layer, wherein the substrate is joined on the surface facing the metal layer to a textile fabric whose filaments are spaced apart, and an adhesion of the metal layer passes a Tesa tape test both on the filaments and between the filaments on the substrate surface.

25. The composite according to claim 21, wherein the substrate is comprised of a polyether ester, polyether amide, or polyether urethane film.

26. The composite according to claim 21, wherein the metal layer is comprised of Al, Cu, Au, or Ag or an alloy of AgGe, CuZn, CuSn, CuAg, or CuAgSn.

27. The composite according to claim 21, wherein the metal layer has a thickness of about 10 nm to about 200 nm.

28. The composite according to claim 21, wherein the metal layer has a thickness of about 30 nm to about 180 nm.

29. The composite according to claim 21, wherein the composite further comprises a protective layer on the surface of the metal layer facing away from the substrate.

30. The composite according to claim 29, wherein the protective layer is a cross-linked polyurethane.

31. The composite according to claim 21, wherein the composite further comprises a textile fabric on the surface of the metal layer facing away from the substrate, which textile fabric has a surface facing the metal layer and a surface facing away from the metal layer, and optionally a second textile fabric on the surface of the textile fabric facing away from the metal layer, wherein the textile fabric is comprised of materials which suppress convection and wherein the surface of the textile fabric facing the metal layer contacts only a part of the surface of the metal layer.

32. The composite according to claim 29, wherein the composite further comprises a textile fabric on a surface of the protective layer away from the substrate, which textile fabric has a surface facing the protective layer and a surface facing away from the protective layer, and optionally a second textile fabric on the surface of the textile fabric facing away from the protective layer, wherein the textile fabric is comprised of materials which suppress convection and wherein the surface of the textile fabric facing the protective layer contacts only a part of the surface of the protective layer.

33. The composite according to claim 21, wherein the composite is in a form of clothing.

34. The composite according to claim 31, wherein the textile fabric comprises a knitted fabric having an area density of 30 g/m2 and a thickness of 250 µm.

35. The composite according to claim 31, wherein the textile fabric comprises a knitted fabric contacting about 20% of the surface of the metal layer or the protective layer.

35. The composite according to claim 32, wherein the textile fabric comprises a knitted fabric having an area density of 30 g/m2 and a thickness of 250 µm.

36. The composite according to claim 32, wherein the textile fabric comprises a knitted fabric contacting about 20% of the surface of the metal layer or the protective layer.